



# inps journal

Indiana Native Plant Society

Fall 2021

## The Value of Old-Growth Forests

**By Leslie Bishop**

When I visit an old-growth forest preserve in Indiana, such as Pioneer Mothers or Donaldson's Woods, I am inspired not only by the size of the trees, but also by the realization that some of these trees have persisted for several centuries.

I notice the large, downed trees in various levels of decay, covered in a variety of fungi, mosses, and ferns. Some of the most decayed logs have literally returned to the earth, and I can crumble what used to be an ancient tree between my fingers. These fallen giants have left gaps in the canopy that allow shafts of light to reach the forest floor where tree saplings flourish, thus creating a forest with a diversity of tree sizes and ages. I also notice large standing dead trees (snags) with holes of various sizes used by a host of invertebrates, birds, and mammals. Some creatures excavate their own holes; others

in the landscape, research is focusing on the ecological role of older secondary forests – forests regenerating after a major disturbance (such as the forest clearing of the 1800's). In the report "Beyond Old Growth," the authors highlight the high conservation value of older secondary forests that are developing ecological attributes of old-growth forests (NCSE 2008). These secondary forests can provide many of the vital ecosystem services of primary old-growth forests. Moreover, with proper planning, these secondary forests will develop into old growth. In Indiana, 45% of



*Leslie Bishop and husband Jeff Hyman collecting data on old growth characteristics of the Back Country section of Morgan-Monroe State Forest.*

repurpose old holes.

Old-growth preserves are special places. For the central hardwood region that includes Indiana, old growth usually refers to a forest whose overstory canopy trees are over 150 years old and that has been relatively undisturbed by humans for the past 80-100 years (Parker 1989). Throughout Indiana (and the broader Midwest region), most primary forests were cleared for timber, agriculture, and grazing during the 1800's European colonization, leaving old-growth forests rare and fragmented. Parker (1989) estimated that only about 3% of the total forest in Indiana is old growth. The existing old-growth remnants in Indiana generally are "primary" old growth – that is, these stands have never been logged. Most are restricted to small, isolated patches of nature preserves scattered across the state.

Given the rarity of primary old-growth forests

state forests are in the 80-120 year age class. Portions of these forests have the potential to reach the old-growth stage in the next 50 to 100 years. But allowing secondary forest to grow into old growth is complicated by the concern about mesophication (see sidebar on page 2) and the resulting shift in forest tree species composition (Nowacki and Abrams 2008) – land managers have the challenge of balancing future old-growth forests with oak-regeneration forests.

Why is old growth (and older secondary forest) important? There are many reasons, but three are primary (for more details and references see Bishop et al. 2021). First, old-growth forests are important to overall biodiversity. A landscape with a mosaic of forests at varying ages can support species of plants, animals, and microbes with varying ecological requirements. Biodiversity in forests is also linked to the vertical dimension


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**Old-Growth** — continued on page 2



## Mesophication Dilemma

In the absence of periodic, low-intensity surface fires, forest communities dominated by oaks (*Quercus* spp.) and hickories (*Carya* spp.) are giving way to shade tolerant, fire-sensitive species. This trend, dubbed forest mesophication, could lead to dramatic changes in the species composition in broad swaths of Indiana forest. Many forest managers, thinking about a climatically warmer and perhaps drier future, are concerned that these forests would be ill equipped for adapting to that future compared to oak dominated communities. Thus, while some percentage of forests may be encouraged toward old growth conditions, others should be kept more open through selective harvest and carefully controlled ground fires. 

spanning from the forest floor to the upper canopy. This vertical complexity is high in old forests due to structural features in the form of large snags and fallen dead trees. These provide habitat for many mammals, birds, herps, and arthropods. For example, in Indiana two rare shrew species are found only within the rotting logs of older forests. Research also shows that different forest successional stages house unique assemblages of lichen and fungus species. When old trees fall, they leave nurse logs and stumps that create unique habitats for many species, and the resulting tree gaps create conditions suitable for early-successional and shade-intolerant species to thrive. And so, structural complexity in an old forest results in increased habitat and species diversity.

Second, old growth is important because multi-aged forests that include old-growth reserves have greater resilience with more pathways for recovery from unpredictable disturbances than do younger forests. In recent years, invasive pests and pathogens, causing the loss of ash (*Fraxinus* spp.), hemlock (*Tsuga* spp.), and fir (*Abies* spp.), among other species, have had both ecological and economic consequences. Future outbreaks are unpredictable. A diversity of tree age classes and sizes, one component of a genetically diverse stand, helps ensure that some unaffected trees remain in the forest. Genetic diversity within populations is proving to be critical for forest resilience against pests such as Emerald Ash Borer (EAB). Despite the high mortality of ash (*Fraxinus* spp.) throughout the region, individual trees continue to thrive and reproduce even when infested with EAB, potentially producing resilient offspring. Old-growth reserves, as part of a broad range of forest communities, ensure that such genetic diversity persists and provide the potential for adaptation to changing climate and landscapes.

Third, old-growth forests are important as we face the challenges of climate change. Recent work shows that older forests remain productive and continue to store carbon in larger amounts compared to younger forests. Further, old-growth forests can be more efficient than younger forests in active fixation of large amounts of carbon as well as in water filtration

and nitrogen cycling. Old growth thus plays an important role in climate mitigation.

It is my hope that public and private forest managers in Indiana will not overlook the need for the development of future old growth. Our current primary old growth nature preserves are highly susceptible to disturbance due to their small size. With active planning for future old growth, Hoosiers two generations from now can continue to experience the awe of visiting old-growth forests as well as continue to enjoy their ecological benefits.

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*Leslie Bishop, Professor Emerita of Biology from Earlham College, is a member of INPS. After over thirty years of exploring Indiana forests, Leslie and her husband recently moved to northern New Mexico where they enjoy exploring a new biota.*

## Answers from page 15 Fern Quiz:

1. Northern maidenhair - *Adiantum pedatum*
2. Bulblet bladder fern - *Cystopteris bulbifera*
3. Spinulose wood fern - *Dryopteris carthusiana*
4. Glade fern - *Homalosorus pycnocarpus*



# What Happened to the White Oaks of Pokagon State Park?

**By Nate Simons**

One of the wise or perhaps serendipitous decisions of the early 19th century was to codify the methodology for surveying boundary lines in lands newly acquired from native American people. Among the requirements was to designate witness trees to aid in relocating survey markers. Trees were blazed, and the species and trunk diameters recorded in the field notes. Those General Land Office surveyor notes have been preserved to this present day and may even be viewed online.

In 2003, while I was assisting with the resource management plan for Pokagon State Park, those notes played an important role. I could compare historic woodland tree species composition, based upon the 1831 surveyor notes, with current conditions. Those historic notes showed that about 28% of the trees in what would become Pokagon State Park were white oak (*Quercus alba*), by far the most abundant tree in the area. All other tree species comprised 12% or less of the forest – but other oak species including black oak (*Q. velutina*) and bur oak (*Q. macrocarpa*) were common. In 2003 I revisited the same survey points and collected tree species data. The change in the composition of tree species was startling. The loss of white oaks (as well as bur oak) within Pokagon State Park was very evident.

So, what happened? As settlement occurred in the mid-nineteenth century, land was cleared of its woodlands to create farmsteads. White oak, valuable as a high-quality, long-lasting building material, was removed extensively. With the purchase of land for the park in the 1920's, agricultural practices stopped. However, with few white oak trees remaining in the vicinity, natural reforestation of the parkland was from wind-disseminated seeds of tree species such as red and sugar maples (*Acer rubrum* and *A. saccharum*) and tulip trees (*Liriodendron tulipifera*) and from bird-disseminated seeds from black cherries (*Prunus serotina*). And plantations of pines (*Pinus* spp.), not native to the region, emerged within the park following the efforts of the Civilian Conservation Corps in the 1930's. The resulting woodland is significantly different in tree species composition from its historic ecology. In my wanderings off-trail within Pokagon State Park, I do notice an occasional white oak ... nothing

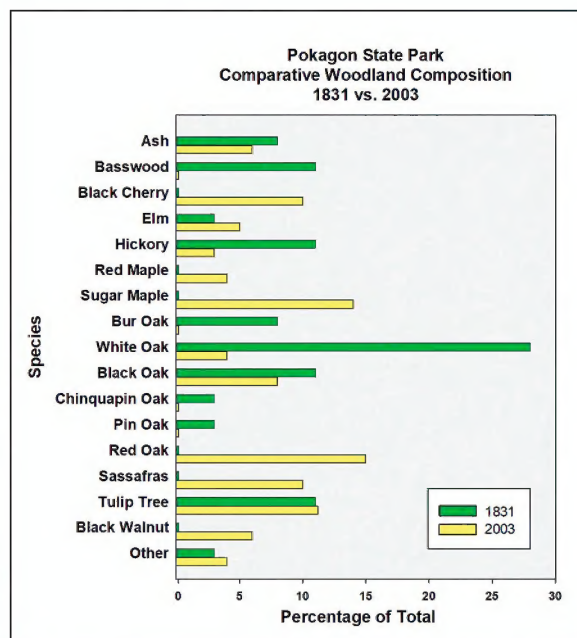
older than one hundred years.

Management to increase the numbers of white as well as bur, chinkapin (*Q. muehlenbergii*), and pin oak (*Q. palustris*) within Pokagon State Park is a slow process. Removal of invasive shrub species, and where possible (and in not too-highly visible locations), removal of shade-producing maples and black cherries allows sunlight to the woodland floor. In the vicinity of existing oak trees, acorns can germinate within the openings created by tree and shrub removal. Another essential component within the oak recovery management tool box is prescribed fire. Fire, a normal and natural process within the oak ecosystem, controls unwanted tree

and shrub growth and removes leaf litter on the forest floor so that acorns can germinate. The recent use of prescribed fire can be seen in the hills adjacent to Lake Lonidaw in the park. There you can see a few of the white oaks that have re-colonized these former agricultural lands.

With persistent stewardship and time, we (okay our grandchildren) may get to experience a vibrant oak ecosystem again in Pokagon State Park. Stay tuned!

*Nate Simons is Director of Blue Heron Ministries, a Christian earth stewardship organization in Steuben County, Indiana. He originally penned this article for their Rustling Grass newsletter.*



*A bar graph comparing the tree observations from 1831 versus 2003. The decrease in white oak abundance, an easy to identify species of keen interest to surveyors and new settlers alike, is striking. The 2003 increase in red oak (*Q. rubra*) may be a consequence of CCC planting effort (Gene DeTurk, personal communication, 29 July 2021).*



# Oaks: The Heart of

**By Paul Rothrock and  
Andrew Hipp**

*"Today's mighty oak is just yesterday's  
nut that held its ground."*

— David Icke

## Native plant profile

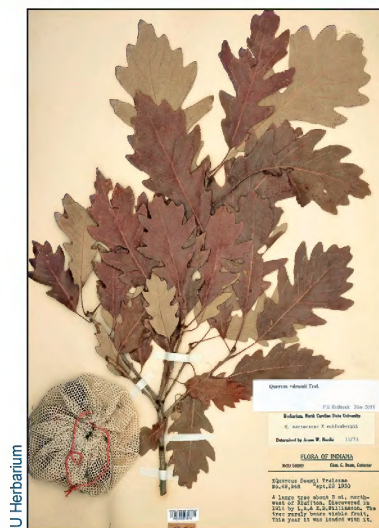
Oaks (the genus *Quercus*) are amazing! At an estimated 435 species worldwide, they foster the diversity of life across the Northern Hemisphere, from fungi and mosses to gall wasps (an estimated 1000 gall species specialize on oaks), birds, and mammals. They shape human culture, feeding us with their acorns and providing wood for our homes, furniture, and ships. Oaks were dedicated to Zeus by the Greeks, to Jupiter by the Romans, and to Thor by the Norse, and the Druids based their ceremonies on them. Indeed, oaks permeate our legends, myths, and culture. And to this day oaks grace Indiana's forests, 19 species or about 1/5 of our forest tree species. They dominate and structure the oak savanna communities of our northwest, drive an internationally important timber harvest industry in the south, and thrive in both swamp forests and dry slopes.

Within the oak genus, the differences between our two major groups, two of the five evolutionary lineages of North American oaks, are readily apparent. The red oak group, species with bristle-tipped leaves, takes two growing seasons to produce their crop of nuts. The white oak group, by contrast, has no bristles on their leaves and generally ripen their acorns in the same year as pollination. Ecologically the two groups stand apart. Gray squirrels preferentially cache red oak acorns to eat at a later date because, given the high levels of indigestible tannin in them, they are less likely to spoil than those of white oaks. Since the leaves of white oaks return more soil-enriching nutrients when they fall, it is not surprising that the two groups support

different suites of leaf chewing insects as well as of soil fungi.

When we get to the species level, however, closely related oaks are often difficult to tell apart. The leaf shape within a species varies greatly, depending upon whether the leaves develop in full sun or shade, as well as the genetic variation across the species. The variation on a single tree can suggest different species in different parts of the tree's canopy. Acorns too can be highly variable: the acorns of bur oak, for example, range from large enough to fill your palm in Texas, at the southern edge of its range, to about nickel-sized at the north edge of its range in Manitoba. This variation within species is compounded by gene flow *between* species. Oaks hybridize fairly readily, and because they are diverse, most species have the opportunity to hybridize with many others. Over the course of generations of hybridization, backcrossing to the parent species, and genetic recombination, the oak genome becomes a mosaic of histories. As a result of this genetic complexity, only recently have scientists been able to decipher the complicated genetic history of oaks through the use of new DNA techniques and statistical methods. This combined with fossil evidence begins to provide a picture of how they acquired the marvelous diversity that we see today (see Hipp et al. 2020 for a more detailed discussion).

The earliest oak record we have are fossil pollen grains that were deposited in central Europe roughly 56 million years ago. Oaks were by that time beginning to form a vast northern forest that likely spread across the continents of North America, Europe, and Asia. This was a hot time in the Earth's history, global temperatures averaged ca. 10 °C hotter than they are now. As temperatures began cooling, about 50 million years ago, oaks moved southward into North America and Eurasia. Lineages became isolated on each continent. Across North America, oak pollen and leaf impressions became common 35 million years ago. By that time, the red and white oaks had split into lineages that further evolved west of the Rocky Mountains versus



*The leaves of Deam's oak (Q. × deamii) lack bristles at the tips of the lobes. Thus it belongs to the white oak group. It is a hybrid formed by a cross between bur oak (Q. macrocarpa) and chinkapin oak (Q. muehlenbergii).*



# Indiana's Forests

the lineages that led to our Indiana species of today. Among our species one can even see a suite of northern versus southern species, the product of further regionalized speciation.

As oaks spread and diversified in each region, members of the red oak and white oak groups encountered similar habitats and repeatedly solved the same ecological problems in novel ways. As a result, we often find red and white oaks growing together in the same habitats. For example, on poor rocky soils and bluffs in southern Indiana you might find the white oak *Quercus stellata* (post oak) growing next to the red oak *Q. marilandica* (blackjack oak). Similarly in lowland habitats of that region you might spot the white oak *Q. michauxii* (swamp chestnut oak) occurring with the red oak *Q. palustris* (pin oak). This coexistence may be further aided by more subtle factors. These species pairs do not share the same diseases, and so diverse communities inhibit the spread of pathogens that might rage through forests of closely related oaks. At the same time, oaks change the soil chemistry and community of soil fungi in ways that may benefit other oaks to the detriment of trees from other genera.

As noted above, oaks have a propensity to hybridize. People often think of hybridization as a destructive force, eroding genetic differences between species. And yet distinctive species persist in spite of this "gene flow." We have reason to believe that periodic migrations of genes between species have helped oaks adapt to novel environments. Genes move from one species to another and become incorporated into the new species. Adaptations can consequently move among oak species, helping them extend their range and, perhaps, respond to rapid climate change. We do know that oaks migrated rapidly as continental glaciers receded starting around 20,000 years ago. Hybridization between species appears to have been one key to their rapid response. Gaining more insight into this phenomenon may allow us to predict how resilient oaks may be as climate change exposes them to fungal and insect diseases with which they did not evolve.

For those of us enthusiastic about native plants, oaks should be high on our list of trees to use in our landscape. They possess many desirable traits: longevity, strong structure, and food sources for nesting birds. And perhaps most surprising of all, properly sited oaks grow rapidly, in our experience up to two feet per year. So plant some; push some acorns into the ground. And remember: "An oak tree is a daily reminder that great things often have small beginnings." (Matshona Dhliwayo)

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## For further reading

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*Paul Rothrock is a member of the South Central Chapter of INPS. Andrew Hipp is currently a Senior Scientist and Herbarium Director at the Morton Arboretum in Lisle, Illinois. Together they have shared many enjoyable years of research collaboration and friendship.*



Paul Rothrock

*Oak savannas of northwestern Indiana, and their rich herbaceous flora, once occupied an extensive zone between the eastern deciduous forest and tall grass prairie. The black oak (*Q. velutina*) trees have a gnarled appearance. They resprout in response to the many natural fires, in contrast to bur oak with its thick, fire-resistant bark.*



Paul Rothrock

*Pin oak (*Q. palustris*) is in the red oak group. The wind-pollinated female flower (see arrow) will take two growing seasons to make a ripened acorn.*



# CCC – Conservation

## By Fred Wooley

As an interpreter at Pokagon State Park in northeast Indiana for 35 years, I was fortunate to meet many wonderful people. I was richly blessed by one visitor in particular, Roger Woodcock.

Roger was from Corunna, Indiana and from 1936 to 1938 was enrolled with Company 556 of the Civilian Conservation Corps, stationed at Pokagon State Park. He went straight from the CCC to the Army, as things were heating

through programs at the park; and while demonstrating rock cutting, he would spin colorful tales about life in the park's CCC camp, filled with rich memories of coping with the Great Depression. Through the CCC he learned skills while leaving the park a better place for future generations.

The scenes at Pokagon played out in many Indiana State Parks and natural areas throughout the country. The CCC was part of President Franklin Roosevelt's New Deal program to create jobs for young, unemployed men. Over three million were employed in the CCC while it existed from 1933 to 1942. Unemployment topped 24% at the time, and only the economic hard times during the recent pandemic have had numbers approach that level.

The CCC relied upon the US Army for infrastructure and organization. Not surprising, the camps resembled an army camp complete with surplus equipment, vehicles, and clothing from WWI. The men, as was true of Roger Woodcock, were young. The "CCC boys" were mostly between 18 and 22, though some lied about their age in desperation for work.

Projects were under the guidance of the Department of Interior. Work mostly focused on state and national forests and parks. Within those properties CCC built infrastructure -- bridges, roads, parking lots, trails, benches, shelters, lodges, and gatehouses. Through preservation and restoration efforts, many structures have withstood the test of time and many are recognized on National Registers of Historic Sites and Areas.

To be sure, not only built environments, but also planted environments remain a legacy of "Roosevelt's Tree Army." They undertook massive reforestation projects where logging or fires depleted that resource. One of the best interpretations of this effort is at Michigan's North Higgins Lake State Park just south of Grayling. The Michigan DNR has kept and fully interpreted a CCC tree nursery with seed storage barns, seed cleaning facilities, seedling germination and sapling beds, a fire tower, and a replica barracks of the camp that was there.

Back home in Indiana, tree plantings took

*A deciduous tree, perhaps a red oak (Quercus rubra), being loaded by members of Pokagon Company 556, before being taken to the planting site.*



Fred Wooley



*Roger Woodcock, circa mid-1980s, demonstrating rock cutting done by the CCC, Company 556 at Pokagon State Park from 1935 to 1942.*

up in the world in the late 1930s. After the war, he returned to northeast Indiana to work on the railroad and pursue his side-interests, tree planting and rock cutting, interests he developed in the CCC.

We became great friends. He taught both me and park visitors about our park and the country's rich history. Rock cutting and masonry were passions and there remain today monument bases, signposts, fireplaces, and special structures made by Roger throughout northeast Indiana. He shared that skill



# Lessons from the Past

place at all CCC sites and some reforestation on state and national forests. There was a mix of species selected. Most were native, but not always. Trees were of both deciduous and coniferous species. Pines, in particular, did well in dry and disturbed soils and provided cover for wildlife and backdrops for recreational activities such as camping and picnicking. In Indiana the list of native conifers is short compared to more northern states. So white pine (*Pinus strobus*) was a popular choice statewide, even though its native range is mostly the northern edge of Indiana. Likewise, Virginia pine (*Pinus virginiana*) was planted in southern Indiana even though historically limited to three Ohio River counties.

At Pokagon, the CCC planted native red cedars (*Juniperus virginiana*), especially around the buildings of their camp. One of our interpretive projects at Pokagon was laying out and interpreting the site of Roger's Company 556 camp. All eleven buildings were gone by the 1950s. What remained were some foundation pieces, the flagpole base showing the sawed-off pole, and trees!

The red cedars planted around the flagpole and near the entrances of buildings were a mere four to five feet tall in the old black and white photographs from the late 1930s. They now tower tall and are joined by a mix of deciduous species. The entire camp is currently visible as mowed paths, mowed footprints of the eleven buildings, and interpretive signage. The original Pokagon gatehouse, constructed by Roger and his peers, has fared better. Today it serves as a mini museum.

Around the CCC camp nonnative lilac (*Syringa vulgaris*) bushes were planted. They are still there and bloom every spring. The edges of camp buildings were dotted with other cultivar shrubs and flowers. A straight row of daffodils (*Narcissus* sp.) pops up and blooms every spring where the camp administration building once stood. Though nonnative, they are not invasive, and I smile every year seeing them blooming, now 85 springs later.

These are all wonderful signs of the

past. Is there a future for another CCC in our state and country? In the 1970s, there was a Youth Conservation Corps (YCC). Unlike the CCC, the YCC were nonresident operations. Thus, there were no camps. Another significant change was that young adults, without regard to gender or race, were employed to do conservation related projects. In the 1930s CCC companies were racially segregated; eight of Indiana's 57 CCC companies employed African Americans. An excellent interpretation of YCC history may be viewed at O'Bannon State Park near Corydon, Indiana.

Today much of Pokagon State Park is covered with mid-age forest. Some CCC plantings, especially of conifers, are fading memories. Flowering dogwood (*Cornus florida*) and redbud (*Cercis canadensis*) were planted around the beautiful, cut-stone gatehouse when built in 1935. In recent years the original dogwoods died; we replaced them with local genotype and avoided the Asian Kousa dogwood (*Cornus kousa*) popular with some landscape companies.

And our friend Roger Woodcock? Roger passed away in 2007 at age 89. He left a legacy at Pokagon, in more ways than one. I still have letters from Roger. He hand wrote them on stationery he created. At the bottom was a crudely drawn rock wall, with a tree at one end. Under it was the phrase, again in his handwriting, "Blessed be the man who plants a tree knowing he will never sit in its shade."

*Fred Wooley (fwooley@frontier.com) is a naturalist, writer, and land preservation/restoration enthusiast. A member of the Northeast Chapter of INPS, Fred lives on part of an old farm overlooking an extensive fen in Steuben County.*



Fred Wooley

*Pokagon gatehouse (May 2021) built by the CCC in 1935, now restored as a mini museum. The flowering dogwood (*Cornus florida*) is a replacement for the original CCC dogwood.*



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To teach people about their beauty, diversity, and importance to our environment.

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# Annual Conference

# Florathon Update


Join us from 1 to 5 pm on November 13 for the INPS virtual annual conference. The theme this year is 'Wild Indiana and Wilding Indiana's Gardens' featuring excellent speakers who'll share enlightening presentations with attendees about both current and historic environmental topics, all related to the appreciation and conservation of Indiana's flora. Here's what you can anticipate as an attendee:

Jim McCormac will speak on **Gardening for Moths**. Jim was botanist with the Ohio DNR and ultimately specialized in wildlife diversity projects.

A pair of talks will feature two of Indiana's best botanists talking about the natural landscapes they know best. Mike Homoya will whet our appetites for nearby adventures with his talk on **Southern Exposure: Indiana's Land of Bluffs, Bayous, and Barrens**. Mike served IDNR Nature Preserves for 37 years and is a respected author of many publications, including *Orchids of Indiana*. Scott Namestnik will take us to our northern border as he reveals **True North: Indiana's Territory of Prairies, Lakes, Forests, and Wetlands**. Scott is now botanist at the Indiana Natural Heritage Data Center, having taken over when Mike Homoya retired.

Paul Rothrock will engage us with his talk, **Charles Deam, The Great Hoosier Botanist**. Paul is emeritus professor from Taylor University and the emeritus associate curator from Indiana University, as well as editor of this Journal. His sedge expertise is manifested in multiple publications, including the recently published *Sedges of Indiana and the Adjacent States, Volume 2: Carex Species*.

In addition, the winners of the annual INPS photo contest will be announced, as well as the results of the Native Plant of the Year vote by members. And be ready for some native plant trivia!

Registration is at <https://indiananativeplants.org/inps-sponsored-events/annual-conference/> and is \$25. Upon registration, you will get the link to sign up for the Zoom conference. 

## By Barbara Homoya

INPS Florathon 2021 is now in the books. Though it was not our *most* successful event in terms of participants or donations, it is notable that, despite the second year of pandemic restrictions, a Florathon still was held and an impressive amount of money was raised.

Between April 17<sup>th</sup> and May 31<sup>st</sup> four individuals, one solo and three on a family team, surveyed seven counties in search of native herbaceous plants in bloom. The highest species total goes to Always Be Botanizing (Mike, Barb, and Wes Homoya) with 100 species and in second place, David Mow with 86.

Perhaps even more noteworthy, however, is that those four individuals raised over \$1000 for Letha's Youth Outdoors Fund! Seventeen donors contributed and 3 new members were added to the INPS membership roll. INPS thanks those donors who gave so generously.

Next year we plan to return to our team format and mount the best and most successful Florathon ever! A challenge to each INPS president and chapter is to field at least one or two teams. In previous issues of the INPS Journal, we have highlighted the experiences of Florathon participants. Without exception, Florathoners have expressed having a fun and educational experience. Some (like myself) have made it a family affair, while others used it to build camaraderie within their chapter. *Please start now* to assemble a team for Florathon 2022. The dates will be April 16-May 30; see the INPS webpage (<https://indiananativeplants.org/>) for further information, or contact Barbara Homoya, Florathon chair, at [florathon@indiananativeplants.org](mailto:florathon@indiananativeplants.org) for questions or if you want to find a team to join.

*Barbara Homoya, member of the INPS Central Chapter, has personally engaged in all four INPS Florathons while serving as chair of the events.*



# Bye-bye *Vinca minor* and Hello Birdie!

## By Gillian Field

I removed periwinkle (*Vinca minor*) vines from a small patch in my yard and within a couple of days a brown thrasher was foraging for food in the same space. The conditions I created to make this a healthy habitat for this native bird included replacing the invasive vines with leaves collected in the fall, a couple of inches thick, and adding some sticks to stop the leaves from blowing away.

This very simple step of placing a layer of crunchy and decaying leaves on bare soil offers a shield from hot sun, wind, and erosion. Any dense mat of invasive vines can be treated this way – remove them, then protect the soil. Over time I will add native ground cover, grasses, sedges, and perennial flowers and expect to see native critters in this restored corner of my garden.

Conservation groups encourage using leaves as part of any habitat restoration. The “Leave the Leaves” Twitter hashtag (#leavetheleaves) is promoted by the Xerces Society for Invertebrate Conservation. Their message: “Leaves are not Litter! They’re food and shelter for butterflies, beetles, bees, moths, and more. Tell your friends and neighbors to leave the leaves.”

Justin Wheeler (2017), in his Xerces blog writes, “Besides providing the right plants, and protecting your garden from pesticides, one of the next most valuable things you can do to support

pollinators and other invertebrates is to provide them with the winter cover they need in the form of fall leaves and standing dead plant material.”

Yet we observe that there are long-standing

habits of raking and disposing of all of the leaves from our gardens every fall. Justin notes we are raking, mowing, and blowing away a bit of nature that is essential to the survival of dozens of arthropod species. And when allowing leaves to remain in parts of our yard and garden, consider leaving them unshredded as a way to protect the eggs, caterpillars, and chrysalises that may already be among them.

In addition to the loss of habitat, there is also a huge financial and carbon cost in having our leaves carted away by city trucks every year. In Bloomington, where I live, the ritual takes place in October and November. To help minimize the annual event and to create positive change, the City Innovation Team was tasked with finding new ways to manage their leaves. A 2020 pilot program was created with volunteers, which led to an even more exciting step to analyze the impact of involving 1000 households in 2021.

City of Bloomington Innovation Director Devta Kidd seeks to enlist more households. Devta reports, “Our goal is to find 1,000 volunteer households to participate in a challenge to compost and mulch as much of their leaves as possible and put only what they cannot mulch or compost in biodegradable bags supplied by the City for collection by the Yard Waste crew and to not use the vacuum truck collection at all.” You can read about their effort at <https://bloomington.in.gov/innovate/2021-leaves> and the history leading up to this solution at: <https://bloomington.in.gov/innovate/2020-leaves>.

Remember: fallen leaves have all the properties and benefits of expensive wood mulch—and they’re free!

## Reference

Wheeler, J. 2017. Leave the Leaves. <https://www.xerces.org/blog/leave-the-leaves> (accessed 12 July 2021)

*Gillian Field is a member of MC-IRIS, also known as Monroe County — Identify and Reduce Invasive Species, a coalition of citizens aimed at reducing the environmental and economic impact of invasive plant species in the county. A version of this article first appeared in the Bloomington Herald-Times (14 May 2021).*



John Flannery / Flickr



Paul Rothrock

Top: Red-banded Hairstreak (*Calycopis cecrops*), is usually seen near the ground. They lay eggs in leaf litter and the larvae feed on decaying leaves of sumacs, oaks, and other trees. Source: Butterflies of Indiana by Jeffery E. Belth, Indiana University Press pp. 329.

Bottom: A loose leaf mulch can be both attractive and ecologically beneficial. Thin leaves such as those of serviceberry (*Amelanchier* sp.; shown here), dogwood (*Cornus* spp.), or birch (*Betula* spp.) are high in calcium and rot during the winter. Thicker lignin-rich oak leaves take longer to decompose. Spread them at a rate of 3 to 4 inches (7.5 to 10 cm) around trees and shrubs and 2 to 3 inches (5 to 7.5 cm) over perennial beds. Avoid black walnut (*Juglans nigra*) leaves; they release plant growth inhibitors.



## Book Review:

### “The Nature of Oaks: The Rich Ecology of Our Most Essential Native Trees,” by Douglas W. Tallamy

## Native Plant of the Year

### Reviewed by Mark Sheehan

As we learn of the extinction of plant and animal species across the continent and hear of new species being added to the endangered species list, habitat loss is often named as a principal cause. Having a place to live and the resources to grow is essential for any species. The more habitat we humans take for ourselves or ruin as a result of our activities, the less remains for other native forms of life.

This is the foundation of Douglas Tallamy's new book, *The Nature of Oaks* (Timber Press, Portland, OR, 2021). Members of the genus *Quercus* in the beech family (Fagaceae), oaks provide habitat and sustenance for a complex ecological web of species, from lichens to mistletoe, gall wasps to walking sticks, birds to bears. An oak tree protects against soil erosion, casts shade, cools the air, locks away excess atmospheric carbon, provides food and shelter, and participates in many other ways in the life cycles of thousands of plant, animal, and fungal species. Other types of trees fill similar roles, of course, but Tallamy makes the case convincingly that oaks do much more of it per tree than anything else you can plant—or preserve.

The book is laid out in 12 chapters, one for each month of the year. It centers on trees Tallamy has planted in a suburban yard much like yours or mine, although Tallamy enlarges and expands the story he tells with examples from much of North America.

As in any of his books, caterpillars and birds are seldom more than a few pages away. To reveal the richness of oak ecology, though, Tallamy introduces dozens of creatures whose life stories will be new to many readers. That includes the recently concluded onslaught of Brood X periodical cicadas with their tree-dependent life cycle.

Tallamy encourages his readers to plant all the oaks they can. He helps dispel some myths that often limit home landscapers' choice of oaks. He even provides several pages of planting advice. Among other tips, he tells us not to amend our soil for oaks, to start with acorns if we can (he tells us how), to plant small seedlings (not saplings or expensive, large-diameter trees) in groups of three or more, and to protect young trees until they are able to resist or survive damage from rabbits and deer.

*The Nature of Oaks* reveals an oak tree, from its roots to its leafy crown, as habitat: a place

### By Michael Homoya

To highlight native plants and their importance to residents of Indiana, the INPS will declare a “Native Plant of the Year” beginning in 2022. Any plant species native to Indiana qualifies for designation.

The process: members of the INPS Council will nominate candidates. Nominations will consider a variety of criteria, including but not limited to, beauty, familiarity, statewide range and abundance, historical interest, suitability for cultivation, and ecological importance. Through a voting process the general membership will be asked to select a winner. The 2022 title holder will be announced November 13 at the 2021 INPS Annual Conference.

This is the inaugural Native Plant of the Year designation for Indiana. It is planned to continue this process on an annual basis.

Candidates (listed alphabetically by scientific name) for the first “Native Plant of the Year” are:

1. butterfly milkweed (*Asclepias tuberosa*) - showy, grows statewide, available, ecologically significant.
2. spring beauty (*Claytonia virginica*) - a spring ephemeral, common statewide, featured in *Wake Up, Woods*.
3. yellow trout lily (*Erythronium americanum*) - a spring ephemeral, common statewide, featured in *Wake Up, Woods*.
4. Deam's penstemon (*Penstemon deamii*) - Indiana's only endemic plant species, rare.
5. fire pink (*Silene virginica*) - INPS proposed this species for designation as state wildflower, widespread, showy.

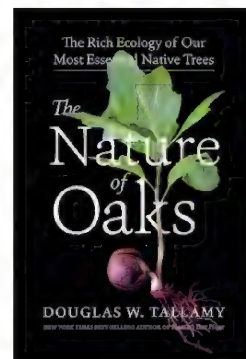
Voting will occur electronically by a survey tool sent to each member via email. (For those without email, paper mail-in will be accepted). Voting will take place sometime before the INPS Annual Conference, with the winner being announced at the conference.

Thank you all for participating!

*Michael Homoya is past president of INPS.*

where many species live and grow in harmony, in competition, or in the harsh reality of predator-prey relations. We humans, who have done so much to cause habitat loss, can give something back to our planet by planting oaks. In his latest book, our planet's friend Doug Tallamy tells us how and why.

*Mark Sheehan is a forest technician in the IU Department of Biology and a member of INPS South Central Chapter.*





# A Fresh Look at

## By Mark P. Widrlechner

Not since Charles Deam in 1940 has anyone taken a close look at the full range of dewberries, blackberries and raspberries found across the Hoosier State. This diverse genus, with its variation due to environment and complicated array of reproductive systems, requires careful attention. In the years since

Deam published his flora, there have only been two major contributions to our understanding of *Rubus* diversity in Indiana. Between 1967 and 1970, Hannibal Davis, Albert Fuller, and Tyreca Davis published a series of papers in the journal *Castanea* that present a framework for a modern revision of blackberries and dewberries

of eastern North America. The three spent considerable time in Indiana, but most of their vouchers are deposited beyond Indiana's borders, in Pittsburgh and Milwaukee. More recently, Gerould Wilhelm and Laura Rericha studied the entire genus in preparation for their *Flora of the Chicago Region*. But their work in the state focused exclusively on seven counties in the northwest corner.

I've been studying *Rubus* since the mid-1980s. It all started when I was walking near my house on the edge of Ames, Iowa and saw a blackberry patch with tasty fruits. I was curious what species it might be, so I brought a sample into the herbarium. At that time, Iowa lacked a state flora and didn't even have a published species checklist. I couldn't find a key to Iowa's *Rubus*, and when I used keys in the reference books that I typically consult, the results varied widely.

Thus began a quest that, so far, has resulted

in the publication of a revision of the genus in Iowa and book chapters covering *Rubus* for the neighboring states of Minnesota and Missouri. Along the way, I learned how important it is to collect specimens that display the full suite of traits needed for identification and to record data about the plant's growth habit. Sadly, many past collections (and even those taken today) often are incomplete.

To remedy this gap, I began to lead workshops on *Rubus* sampling and identification. In July 2018, I gave one of these workshops to the Missouri Department of Conservation. Scott Namestnik (now State Botanist for the Indiana Dept. of Natural Resources) learned about it and asked if I'd be willing to conduct a similar workshop in Indiana. I told him I was interested, but that I had not studied *Rubus* in his region. I like to include a hands-on field component to these workshops, so we decided to meet in 2019 and assess *Rubus* diversity in the northwestern counties.

In July 2019, we visited some wonderful habitats, and I was very impressed. So much so, in fact, that I felt a bit intimidated. During a day and half in the field, we saw at least 18 different taxa (some of which I'd never seen in the field before). At that point, I told Scott that I really needed to get better acquainted with the full range of species that might be present. In preparation for a workshop, I could see two ways to go about doing that. First, I could spend more time in Indiana exploring various habitats that might harbor *Rubus* diversity -- prairies, savannas, and bogs (and other sites with acidic substrates). Second, I could survey Indiana's key herbaria to learn which species have already been documented and where they might grow.

As 2020 approached, I wrote a proposal to the INPS to cover my travel expenses in order to visit five of the state's largest herbarium collections. I also expected to spend more time in the field with Scott. INPS agreed to support visits to Notre Dame, Indiana University, Huntington University, Butler University, and Purdue University, and dates were set for late March 2020. Of course, COVID-19 changed everything. About a week



Paul Rothrock

The floricate of Allegheny blackberry (*R. allegheniensis*). Notice that, compared to the primocane, its leaves have three leaflets and are relatively small.



# Indiana's *Rubus*

before my planned departure, I received urgent messages informing me of impending lockdowns. Out-of-state travel for field work also became impossible.

Finally, with the introduction of effective COVID vaccines in Spring 2021, it once again became safe to travel. In late May and early June I spent seven days examining nearly 1100 *Rubus* specimens collected around the state, the largest number by Deam himself. I was deeply impressed by the quality and completeness of his specimens, especially in comparison to those made by many of his contemporaries. During my visit, I was able to identify about 85% of those specimens to the species level and provide a full report to INPS and all the gracious herbarium curators and staff who helped me work with their holdings.

On the plus side, there was good geographic and taxonomic coverage. I found at least one good example of all the species I expected to find based on my past studies focused on other parts of the Midwest. Only five of Indiana's 92 counties were total misses. (If INPS members are interested in making *Rubus* collections in Adams, Benton, Carroll, Jay, or Rush Counties, they would definitely be filling in gaps in our knowledge base.)

Through this work, I've now seen and annotated specimens of four species of true raspberries (and an interspecific hybrid); the beautiful purple-flowering raspberry (*R. odoratus*); Indiana's only truly herbaceous species, *R. pubescens*; 13 species of highbush blackberries; 18 species of dewberries; and two species of bristleberries.

On the minus side, only about 10% of the specimens that I saw were collected after 1950. Thus, the knowledge gained about Indiana's *Rubus* diversity applies most directly to a baseline gathered more than 70 years ago. This is troublesome for at least two reasons. First, it's conceivable that urbanization and other changes in land-use practices have led to the decline of species that were once common in the state or even to the extinction of the rarest ones. Second, there are four invasive *Rubus* species, native to Europe and Asia, that have been spreading in neighboring states, disrupting native plant

communities. Among existing specimens, I found only limited evidence documenting these invasive species, but observed live plants of both Himalayan blackberry (*R. armeniacus*) and Japanese raspberry (*R. parvifolius*) during the eleven days that I traveled around the state.

Hopefully this fresh look at Indiana's *Rubus* will lead to a better understanding of the species present in the state, which ones might be most vulnerable, and which others might be most disruptive. I hope that I'll be able to return to Indiana and spend more time exploring its natural areas, with the goal of offering a workshop to INPS members and other interested botanists. Stay tuned.

*Mark P. Widrechner is a member of another INPS, the Iowa Native Plant Society, and is an Affiliate Associate Professor of Horticulture at Iowa State University.*

*The primocane leaves of Allegheny blackberry are large and have five leaflets.*



Paul Rothrock

## A couple questions about *Rubus*:

### **Why is *Rubus* taxonomically complicated?**

Some treatments recognize numerous species, while other, comparably qualified botanists only recognize a few, more variable species. One root cause is the complexity of reproductive behavior in the genus. There are hybrids between relatively distinct populations. There are polyploid populations. In these plants there are multiple sets of gene-carrying chromosomes that reproductively isolate them from "normal" populations. To further confuse matters, *Rubus* completes a great amount of reproduction asexually or may even produce seed without fertilization.

### **What constitutes a "good" *Rubus* specimen?**

A complete specimen would include a portion of the plant in its first year of growth (the primocane), a portion from the second year bearing branches with flowers and/or fruits (the floricanes), and notes about the rooting behavior and growth habit that are not readily preserved on an herbarium specimen. Together these give the full picture necessary for classifying and identifying the species.





Because of her husband, she became interested in botany and illustrated several of his books. When Willard was director of the Butler Botanical Gardens and Holliday Park, Ida would often take her brushes and easel to these nature spots for sketches. She regularly exhibited at the Hoosier Art Salon and the Herron Art Museum. His book *Swamp and Dune: A Study in Plant Distribution* was dedicated to Ida, "Whose companionship during these investigations has added much to the study."

His books on ferns and plants are timeless classics. I was able to purchase copies of *Our Ferns, Their Haunts, Habits, and Folklore* (1938) and *The Useful Plants of the World* (1928) on the second-hand market. *The Fern Collector's Guide: Where to Find and How to Name the Ferns* (1902) and several other of his 19 books are digitized on [hathitrust.com](http://hathitrust.com). They are easy to understand and give the reader a greater appreciation of botany. The voice of his writing is that of a well-liked man of many interests. He often composed short jingles about his students, and he even published a book of poems in 1935, *Off the Road*.

Clute's botanical interests were broader than a simple love of ferns. During the 1920's he researched an area in Will County, northeast Illinois, with dry sand prairies and sand savannas. The result, a book entitled *Swamp and Dune*, has proven influential. Between 1980 and 1987 the best remnant communities became the 315-acre Braidwood Dune and Savanna Nature Preserve. The importance of Clute's work and the Braidwood area are recognized in *A Natural History of the Chicago Region* (Greenberg 2002). It even influenced a future family member. I was fortunate to locate a great great niece, Jennifer McHenry, whose

career choice was molded by Willard Clute. She is currently a PhD candidate. Jennifer has been to Braidwood Dune and Savanna Nature Preserve and shared an article with me about her visit and the connection of the preserve to her ancestor.

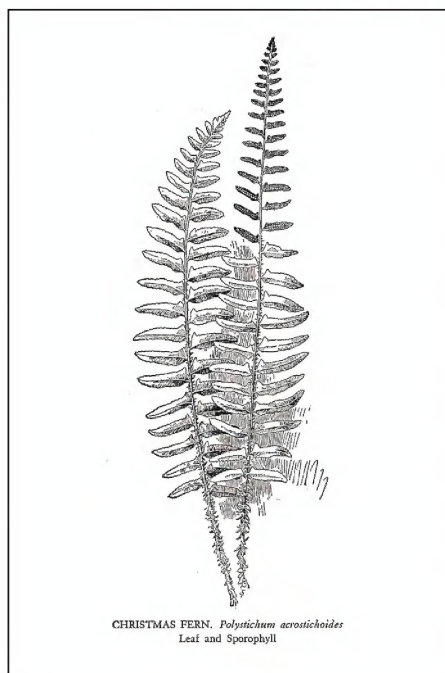
Inspired by Clute, I paid particular attention to ferns on my spring and summer hikes in northeast Indiana. In April, ferns started to appear in woods along creeks and rivers and in rocks and mossy areas. My tally of sixteen species included dramatic glade fern (*Homalosorus pycnocarpus*) and the curiously cut northern maidenhair (*Adiantum pedatum*). With species such as bulblet bladder fern (*Cystopteris bulbifera*) and spinulose wood fern (*Dryopteris carthusiana*) one can see how they received the moniker "nature's lacework". Ferns are some of the first and last green seen during the year. Christmas ferns (*Polystichum acrostichoides*) will even stay green in cold months. But before then, I must seek out cinnamon fern (*Osmundastrum cinnamomeum*) which hangs out in tamarack bogs and swamps about lakes.

Because of the wealth of scientific writings that Willard Clute produced, I have a much greater appreciation for ferns and his contributions to the field of botany. Cheers to Willard and Ida (Martin) Clute who put down roots in Indiana and made significant contributions to the Hoosier state.

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- TIN (The Indianapolis News). 1950. Willard Nelson Clute Obituary, *The Indianapolis News*, 08 Mar 1950, p. 8.
- TIN. 1952. Ida Martin Clute Obituary, 10 Nov 1952, p. 22.

*Terri Gorney Lehman is a member of INPS Northeast Chapter who loves to explore botanical history.*



CHRISTMAS FERN. *Polystichum acrostichoides*  
Leaf and Sporophyll

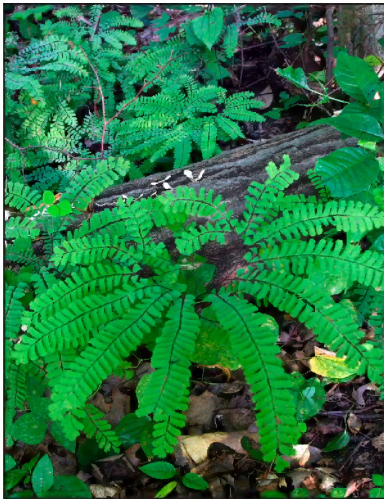
*A drawing of Christmas fern by Ida M. Clute used to illustrate one of her husband's books on ferns.*



# Terri's Fern Quiz

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Here are four species of ferns spotted by Terri in northeast Indiana. Do you recognize them?  
Quotations are from Willard Clute's "Our Ferns in Their Haunts" (1901).  
(Answers on page 2.)



1.

*"Because of its delicate beauty it is much sought by those who delight in woodland rambles. At maturity stipe and rachis are smooth, dark and shining — among the handsomest of their kind."*



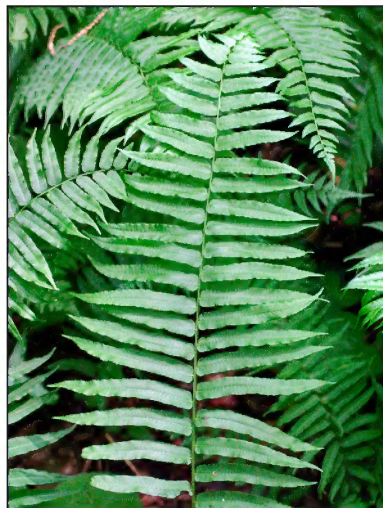
2.

*This species grows "wherever there is a line of shaded, dripping cliffs, especially in limestone regions" and its "long narrow fronds hang downward in profusion as if to cover the cliff like a curtain."*



3.

*"The blade is nearly three times pinnate ... and spinulose toothed. The pinnules on the inferior side of the pinnae are elongated, especially in the lowest pair."*



4.

*"The fronds are thin and delicate, sensitive to frosts. Its blades are simply pinnate with many long, narrow pinnae. The fertile fronds are usually the taller and their pinnae much narrower."*







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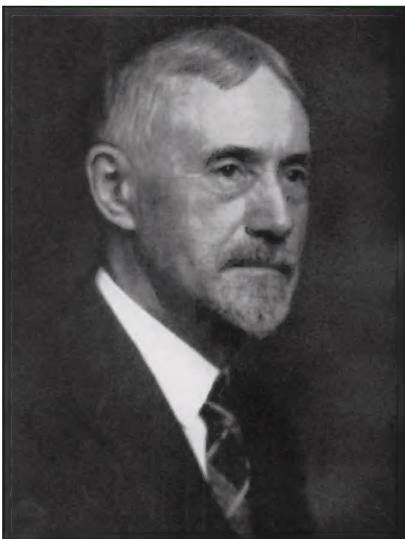
# The Uncoiling Fronds: Willard Nelson Clute

*By Terri Gorney Lehman*

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*“Nature made ferns for pure leaves to show what she could do in that line.”  
— Henry David Thoreau*

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*Willard N. Clute, 1869-1905. Image courtesy of American Fern Journal.*

Willard Nelson Clute, like Thoreau, must have contemplated the grace and beauty of ferns. He made them a central part of his life's work, producing a number of important books on the subject and a fine collection of specimens, especially ferns of Jamaica found in several major herbaria. In 1893 at the age of 24, he co-founded the American Fern Society. He would be an active member of this society until his death fifty-seven years later.

Willard Clute, was a native of Steuben County, New York (TIN 1950, Morton 1951). He became the Assistant Curator of the Botany Department at Columbia University and, at the founding of the New York Botanical Garden in 1891, joined their staff. From 1902-1928 he taught botany and agronomy in high schools in Illinois. During this time, he authored several textbooks that were widely used. In addition he edited *The American Botanist*, a journal for plant lovers (much like our INPS Journal), from 1901 to 1948.

His Hoosier connection came in 1928 when he accepted a position at Butler University in Indianapolis as Director of the new Butler Botanical Gardens. To his fellow fern botanist, Dr. William Maxon at The Smithsonian Institution he wrote, “We are to have 1000 acres of park land, \$3,500 a year for plants, and \$90,000 for a building, to house library, auditorium, museum, art gallery, and conservatory. Now, if we have the brains, we shall astonish the world.” Today, many of his plant collections reside at the Friesner Herbarium at the University. Some of his specimens have been digitized and are available for online research.

Upon his retirement from Butler University in 1938, Clute accepted the position as the first director of the new Holliday Park in Indianapolis. This entailed developing 94-acres of John Hampton Holliday's property into a public park (CLF 2021).

In 1897, he married Ida Martin who was a talented artist and illustrator (TIN 1952).

*Clute — continued on page 14*